

WHAT IS CLAIMED IS:

1. A hydraulic ram pump for lifting formation fluids out of a wellbore comprising
a main body having an axial bore;
a formation fluid inlet connected to said axial bore at one end of said main
body;
means forming a formation fluid outlet for conducting fluid flow from the
other end of said main body;
a normally open valve means axially aligned with said main body located
within the fluid passageway for permitting fluid flow conducted out of said
formation fluid outlet end, and into a formation external of the pump;
a chamber means having a normally closed inlet means axially aligned with
said main body;
means for receiving, landing, sealing, and securing said chamber means
within said main body axial bore;
an annulus formed between said chamber means and said main body, means
forming a flow passageway such that formation fluid can flow into said formation
fluid inlet end of said main body, into said formed annulus, to said normally open
valve means, whereas the formation fluid flow is permitted from said normally open
valve means, into said formation fluid outlet, such that formation fluid flow passes
from the said formation fluid outlet as discharge fluid;
said chamber means, wherein said normally closed inlet is comprised of at
least one normally closed valve means axially aligned with the said chamber means

PATENT APPLICATION

being located in the fluid inlet passageway for permitting fluid flow to said chamber means;

said chamber means, wherein said normally closed inlet is extended axially, aligned with said chamber means, having at least one side port for formation fluid flow to said normally closed valve means, forming a landing profile with restrictive shoulders and seal system to interact with said main body;

said chamber means having a normally closed inlet at one end, means forming a connection adapted for chamber tubing on said chamber means other end, said chamber tubing being added to said chamber means for desired chamber volume, having a tubing capping means affixed to the open chamber tubing end;

said chamber means, further including said chamber tubing and said affixed capping means, wherein an intrusive tubing means parallel or axially aligned with the said chamber means, through which at least one fluid outlet end adapted for tubing connection is provided, said intrusive tubing means penetrating and sealing against said affixed capping means;

said intrusive conduit means providing a fluid passageway such that formation fluid can flow from said chamber means near said normally closed inlet means end, through said affixed capping means, to said adapted outlet end;

said chamber means, wherein an annular chamber is formed between said chamber means and said intrusive conduit means, provides an annular collecting chamber for a gaseous substance such as air;

PATENT APPLICATION

43 a conduit means having at least one formation fluid inlet means, providing a
44 fluid passageway for conducting said formation fluid downward is connected to said
45 formation fluid inlet.

46
1 2. A hydraulic ram pump according to claim 1, further including a conduit means
2 having at least one sealing means such as a packer assembly providing a seal
3 between the wellbore and said conduit means, having at least one landing profile
4 means for receiving flow control devices and other useful tools, is connected to
5 said hydraulic ram pump at said formation fluid inlet.

6
1 3. A conduit means of claim 2, whereas said conduit means is comprised of tubing
2 axially aligned with the said chamber means, creating an annular fluid
3 passageway such that formation fluid flow in said annular fluid passageway is
4 downward, into said formation fluid inlet and into said hydraulic ram pump.

5
1 4. A conduit means of claim 2, whereas said conduit means is comprised of tubing
2 aligned parallel with said chamber means, such that formation fluid flow in said
3 tubing is downward into said formation fluid inlet and into said hydraulic ram
4 pump.

5
1 5. A conduit means of claim 2, whereas said conduit means is comprised of tubing
2 coiled around said chamber means in a downward direction, such that formation

PATENT APPLICATION

3 fluid flow in said coiled tubing spirals downward reaching said formation fluid
4 inlet and into said hydraulic ram pump.

5
1 6. A conduit means of claim 1, whereas said conduit means having at least one
2 formation fluid inlet means that is controllable.

3
1 7. A hydraulic ram pump of claim 1, whereas at least one sealing means such as a
2 packer assembly is providing a seal between the wellbore and said hydraulic ram
3 pump.

4
1 8. A hydraulic ram pump according to claim 1, further including a tubing means,
2 connected to said intrusive conduit means adapted fluid outlet, providing a fluid
3 flow path upward such that fluid can flow from said chamber means near said
4 normally closed inlet means end, into said intrusive conduit means, through said
5 affixed capping means, to said intrusive conduit means adapted outlet end, into
6 said tubing means, to a higher elevation or to a earth surface elevation for
7 storage and use.

8
1 9. A hydraulic ram pump according to claim 1, further including said conduit
2 means, of claim 2, whereas said intrusive conduit means comprises a tubing
3 means;

4 said affixed capping means comprises a wellhead means;

PATENT APPLICATION

5 said chamber means and conduit means originate from said wellhead means,
6 stretching downward in a wellbore to said hydraulic ram pump location, terminating
7 in said respective hydraulic ram pump connections;

8 said tubing means provides a flow passageway such that fluid can flow from
9 said chamber means near said normally closed inlet means end, through said
10 wellhead means, to said surface storage and use.

11
1 10. A hydraulic ram pump according to claim 9, whereas said wellhead means
2 provides a communication port to said annular chamber means.

3
1 11. A hydraulic ram pump according to claim 9, whereas said tubing extending
2 from said wellhead means provides fluid flow controls for storage and use.

3
1 12. A hydraulic ram pump according to claim 1, whereas said normally open valve
2 means employs an adjustable spring or weight assist to open.

3
1 13. A hydraulic ram pump according to claim 1, whereas said normally open valve
2 means employs an opposing slidable piston and cylinder means responsive to
3 formation fluid pressure acting on both said normally open valve means and said
4 opposing piston and cylinder means to approximately balance the valve closure
5 forces;

PATENT APPLICATION

6 said valve means and said opposing piston means are integral having an
7 axially aligned communication port;
8 additionally having an adjustable spring assist to open.
9

1 14. A hydraulic ram pump according to claim 1, whereas said normally open valve
2 means employs an opposing slidable piston and cylinder means responsive to
3 pump back pressure acting on both said normally open valve means and said
4 opposing piston and cylinder means to approximately balance the valve closure
5 forces;

6 said valve means and said opposing piston means are integral having an
7 axially aligned communication port;
8 additionally having an adjustable spring assist to open.
9

1 15. A hydraulic ram pump according to claim 1, whereas said normally closed valve
2 means employs an adjustable spring or weight assist to close.
3

1 16. A hydraulic ram pump according to claim 1, further including a wireline
2 retrievable valve unit, axially aligned with the said chamber means, comprised
3 of said closed valve means and said open valve means;
4 said unit outer profile can be landed, sealed, and secured within said
5 chamber means extended normally closed inlet;

PATENT APPLICATION

6 having at least one side port for formation fluid flow to said normally closed
7 valve means,
8 having at least one side port for formation fluid flow to said normally open
9 valve means, said side port aligned with a side port in said extension;
10 retrievable through said tubing means.

11
1 17. A hydraulic ram pump according to claim 1, further including said closed valve
2 means comprises a replaceable check valve and seat, said seat being reversible.

3
1 18. A hydraulic ram pump according to claim 1, further including said open valve
2 means comprises a replaceable impulse valve and seat, said seat being
3 reversible.

4
1 19. A hydraulic ram pump according to claim 1, further including said main body
2 having a restricting side port in close proximity of the said normally closed
3 valve means such that a gaseous substance can flow into said main body.

4
1 20. A hydraulic ram pump for lifting formation fluids out of a wellbore comprising:
2 a main body having a formation fluid inlet passageway through which
3 formation fluids may flow, a lifted fluid outlet passageway through which lifted
4 fluid may flow, and a spent formation fluid outlet through which waste fluid may
5 flow;

PATENT APPLICATION

6 a conduit means having at least one formation fluid inlet means, providing a
7 fluid passageway for conducting the formation fluid downward into said main body
8 formation fluid inlet passageway;

9 a pressure chamber formed from said main body, separated by a normally
10 closed valve means permitting a portion of said formation fluid, now lifted fluid, to
11 flow through said lifted fluid outlet into said pressure chamber;

12 a normally open valve means mounted within said main body, said normally
13 open valve means permitting said waste fluid to flow out of said main body through
14 said spent formation fluid outlet and to a formation external of the pump;

15 a tubing outlet means connecting to said pressure chamber, providing a fluid
16 passageway through which said lifted fluid may flow into tubing to be lifted to a
17 higher elevation.
18

1 21. The pump of claim 20 wherein said pressure chamber comprising: said tubing
2 and said pressure chamber wall both suspended from a wellhead, said tubing is
3 spaced from the said pressure chamber wall with there being an annular space
4 formed therebetween;

5 a sealing sub divides said annular space formed into an upper annular
6 chamber and lower annular chamber;

7 said upper annular chamber may form an annular collecting chamber for a
8 gaseous substance such as air;

PATENT APPLICATION

9 said lower annular chamber forms said conduit means having at least one
10 formation fluid inlet means, providing a fluid passageway for conducting the
11 formation fluid downward into said main body formation fluid inlet passageway;
12 said sealing sub divides said tubing into upper tubing and lower tubing;
13 said lower tubing providing a fluid passageway for conducting the lifted
14 fluid upward from said main body, through said lifted fluid outlet;
15 said normally closed valve means permitting flow of lifted fluid into said
16 upper tubing, and out through slotted tubing ports into said upper annular chamber;
17 said upper tubing providing a fluid passageway for conducting the lifted
18 fluid upward from said upper annular chamber, through said slotted tubing ports,
19 into said upper tubing commingling with said lifted fluid arriving from said lower
20 tubing upward to a higher elevation or to an earth surface elevation for storage and
21 use.

22
1 22. A hydraulic ram pump according to claim 20, whereas said conduit means
2 having at least one sealing means such as a packer assembly providing a seal
3 between the wellbore and said conduit means, having at least one landing profile
4 means for receiving flow control devices and other useful tools.

5
1 23. A conduit means of claim 20, whereas said conduit means having at least one
2 formation fluid inlet means that is controllable.
3

PATENT APPLICATION

1 24. A hydraulic ram pump according to claim 20, whereas said normally open valve
2 means employs an adjustable spring or weight assist to open.
3

1 25. A hydraulic ram pump according to claim 20, whereas said normally closed
2 valve means employs an adjustable spring or weight assist to close.
3

1 26. A hydraulic ram pump according to claim 20, whereas said normally open valve
2 means employs an opposing slidable piston and cylinder means responsive to a
3 pressure differential acting on both said normally open valve means and said
4 opposing piston and cylinder means to approximately balance the valve closure
5 forces;

6 said valve means and said opposing piston means are integral or threadedly
7 joined having an axially aligned communication port;

8 said integral valve and piston having an adjustable spring assist to open.
9

1 27. A hydraulic ram pump according to claim 20, further including a wireline
2 retrievable valve unit comprised of:

3 said closed valve means and said open valve means;

4 said unit outer profile can be landed, sealed, and secured within said lower
5 tubing;

6 having at least one side port for formation fluid flow to said normally closed
7 valve means,

PATENT APPLICATION

8 having at least one side port for formation fluid flow to said normally open
9 valve means, said side ports in communication with said main body formation fluid
10 inlet passageway;

11 said valve unit is wireline retrievable through said tubing.

12
1 28. A hydraulic ram pump according to claim 21, whereas said wellhead provides a
2 communication port to said upper annular chamber for removal or addition of
3 said gaseous substance, for monitoring gas pressure.

4
1 29. A method for completing a subterranean fluid zone penetrated by a wellbore,
2 comprising the steps of:

3 positioning a casing structure having more than one side opening in
4 the wellbore proximate the fluid formation to be pumped;

5 said casing structure to extend past said fluid formation a reasonable
6 distance for cementing in place;

7 flowing cementitious material externally about said casing structure
8 forming a seal between said wellbore and said casing structure, holding said
9 fluid formation clear of cement;

10 positioning a first tubular structure within the casing structure
11 continuing into the open wellbore until arriving near the receiving formation
12 comprising:

PATENT APPLICATION

13 a hydraulic ram pump main body attached to the end of the first
14 tubular structure;
15 an anchoring and sealing device such as a packer attached within
16 said first tubular structure;
17 a ported tubular section attached within said first tubular structure;
18 a sealing device such as a sealing sub attached within said first
19 tubular structure;
20 said first tubular structure; wherein the first tubular positioning step,
21 said anchoring and sealing device is sealingly engaged below said casing
22 structure openings, and above said casing structure lower end within said
23 casing structure;
24 positioning a second tubular structure within said first tubular
25 structure comprising:
26 a hydraulic ram pump valve unit-landing sub attached to the end of
27 the second tubular structure;
28 a slidable sealing device such as a seal joint for mating with said
29 sealing sub disposed within said first tubular structure;
30 a ported tubular section attached within said second tubular
31 structure;
32 said second tubular structure; wherein the second tubular
33 positioning step, said valve unit landing sub device is sealingly engaged
34 within said hydraulic ram pump main body;

35 said slidable sealing joint is sealingly engaged within said sealing
36 device;
37 positioning a wireline retrievable valve unit sealingly engaged
38 within said second tubular structure valve unit landing sub device;
39 positioning a casing head and wellhead, suspending said first and
40 second tubing structures using said wellhead, the final positioning of
41 equipment for pumping said fluid formation.

42

1 30. The method for completing of claim 31, whereas said casing structure extends to
2 the full depth of the wellbore.

3

1 31. A method for pumping fluid from a wellbore penetrating a subterranean fluid
2 zone formation comprising the steps of:

3 determine the location in a subterranean fluid zone, a fluid bearing
4 formation to be pumped and the presence of a lower formation(s) capable of
5 receiving the fluid flow from said upper pumped formation;

6 positioning a downhole hydraulic ram pump near the end of the tubing
7 strings in a wellbore proximate said receiving formation,

8 positioning a first tubular string within the wellbore, allowing formation
9 fluid to flow down an annulus surrounding a second tubing string;

10 setting at least one packer within said wellbore adjacent said formation and
11 against the wall of the open hole, said packer having at least one passageway

PATENT APPLICATION

12 extending through said packer to provide formation fluid communication

13 intermediate said formation and the interior said tubing strings;

14 positioning said second tubing string within said first tubular string to

15 provide formation fluid communication such as flow from said downhole hydraulic

16 ram pump upward in the direction of the earth's surface;

17 providing a fluid communication path through the downhole hydraulic ram

18 pump and communicating formation fluid therethrough, farther providing

19 communication with said receiving formation(s) exterior of said pump;

20 closing a normally open valve within said pump in response to the flow of

21 formation fluid through said pump fluid communication path such that the closure of

22 said valve ends the flow and creates a condition of compression for a fraction of a

23 second;

24 redirecting said formation fluid in compression within said pump, destined

25 to exit said pump, ramming said fluid through said pump's normally closed valve,

26 and into said second tubing string;

27 sensing a back flow, said normally closed valve closes trapping the

28 compressed fluid within said second tubing string, compressing the gas trapped in an

29 annulus surrounding said second tubing string, storing energy developed from said

30 falling annular fluid;

31 pushing said trapped fluid upward within said second tubing to the earth's

32 surface;

33 repeating said flow and valve actions, fluid production is attained;

34 adjusting the flow rate of formation fluid through the fluid communication
35 path, thereby controlling the output of the pump.

36

1 32. The system of claim 31, further comprising:

2 an anchoring and sealing device such as a packer attached within said first
3 tubular string; wherein an anchoring and sealing device is sealingly engaged
4 below the casing flow openings, and above said casing lower end within
5 said casing.